Remarks: Examination Report

1. Claims 1-33 and 35-39 are pending.

2. Claims 1-7, 9-33, and 35-39 were rejected under 35 U.S.C. 103(a) as being unpatentable over Agee (U.S. 6,128,276) in view of Wallmeier (U.S. 6,553,033).

3. With regard to Claims 1-7, 9-33, and 35-39, the Examiner states that although Agee does not specifically disclose providing for multi-stage combining of the weighted spectral components (such as recited in the Independent Claims 1, 20, 31, and 35), Wallmeier teaches providing for multi-stage combining of the weighted spectral components.

4. Claim 8 was rejected under 35 U.S.C. 103(a) as being unpatentable over Agee (U.S. 6,128,276) in view of Wallmeier (U.S. 6,553,033) and further in view of Raleigh (U.S. 5,809,422).

5. In Section 5 of the Office Action, the Examiner states, "In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., *to change this MAC-layer protocol so as to resemble or reflect the Physical-Layer protocol of the present invention*) are not relied in the rejected claim(s)."

6. Accordingly, Independent Claims 1, 20, 31, and 35 were amended to distinguish the Independent Claims 1, 20, 31, and 35 (and thus, the dependent claims 2-19, 21-30, 32-33, and 36-39) from the prior art. In particular, language was added to the claims that clarifies that the invention pertains to a Physical-Layer protocol, which is performed prior to converting received signals to data symbols.

7. Applicant submits that the above-recited step of providing for multi-stage combining of the weighted spectral components to cancel co-channel interference prior to decision processing for estimating received data symbols in the Independent Claim 1 (and hence in the dependent claims 2-19), the step of providing for multi-stage demultiplexing of the interfering signals by processing either or both the amplitude variations and the phase variations of the plurality of spectral components in a multi-stage demultiplexer prior to estimating received data symbols in a decision processor recited in Independent Claims 20 and 31 (and hence in the dependent claims 21-30 and 32-34), and the above-recited multistage spatial demultiplexer, said multistage spatial demultiplexer coupled between said diversity receiver and a decision processor adapted to estimate received data symbols in Independent Claim 35 (and hence in the dependent claims 36-39) present novel methods and structure that the cited combination of prior-art references neither describe nor anticipate.

8. In particular, the clarification stating that the multi-stage combining is provided prior to decision processing for estimating received data symbols (such as recited on Page 11, lines 29-30 and Page 13, lines 28-29, and illustrated in FIG. 7 in the present application) distinguishes the claimed invention as a Physical Layer solution, as opposed to Wallmeier, which is a Data Link Layer (e.g., a MAC Layer) solution. Conversely, Wallmeier teaches a data-processing technique that first requires the acquisition of data bits.

9. **The cited and relied-upon references Wallmeier and Agee pertain to different and unrelated fields in the art.** The combination of Wallmeier and Agee represents a combination of unrelated references. In particular, Agee and the claimed invention relate to Physical Layer signal processing, which deals with the physical aspects of the media being used to transmit the data, such as waveforms employed for transmitting data. In particular, Agee attempts to enhance signal separation across interfering **Physical-Layer** channels to **increase capacity** (Agee, col. 29, lines 1-7). However, Wallmeier describes a Data Link Layer protocol, which controls the flow of data over the network from one device to another, and thus relates to the flow of

data symbols or data bits. Specifically, Wallmeier teaches to control data flows (via data multiplexing and demultiplexing) to ensure that peak flow rates are not exceeded (Wallmeier, col. 2, lines 14-52). **The suggested combination of references from disparate fields which is required to characterize the claimed invention demonstrates that the claimed invention should be patentable under U.S.C. 103.**

10. **The prior art must provide a suggestion or motivation to combine the references (MPEP 2143.01). However, the prior art fails to suggest any utility in combining Wallmeier and Agee.** In summary, Agee and Wallmeier attempt to solve unrelated problems. Agee attempts to enhance signal separation across interfering **Physical-Layer** channels to **increase capacity** (Agee, col. 29, lines 1-7) whereas Wallmeier teaches to match data rates **via Data Link Flow Control** to the **fixed capacity** of connection elements (Wallmeier, col. 2, lines 14-52 and col. 3, lines 3-29).

11. **Since Wallmeier and Agee solve different and unrelated problems, there is no motivation in the prior art to apply the multistage demultiplexer taught by Wallmeier to solve the problem addressed by Agee.**

12. In Section 5 of the Office Action, the Examiner states that the motivation to combine Agee and Wallmeier can be found in Wallmeier such that the cell (i.e., data) rates can be optimally matched to the transmission capacity. However, **Agee and Wallmeier solve different problems**. Therefore, there is no teaching within these prior-art references to suggest the combination of Agee and Wallmeier. Rather, the claimed invention recites multistage combining and multistage demultiplexing **prior to decision processing** (which produces data symbol estimates). Since the demultiplexing and combining recited in the present invention are performed **before the received signals are converted to data symbols**, the claimed invention defines a particular Physical Layer protocol. Therefore, **applying a Data Link Layer solution intended to control a data rate to a Physical Layer process of interference cancellation does not constitute a reasonable expectation of success with regard to improving the interference cancellation.**

13. **The proposed combination of Agee and Wallmeier would change the principle of operation of the prior-art invention disclosed in Agee.** In particular, the adaptation of a multi-stage demultiplexer intended to control the maximum rate of data symbols applied to a physical layer solution that uses interference cancellation to increase the number of physical communication channels requires a substantial reconstruction and redesign of the method and apparatus shown in Agee. For example, the Wallmeier system should ordinarily follow the "sync & demod" module 336 in Agee FIG. 12. However, in order to emulate the claimed invention, the Wallmeier system needs to be implemented at the deMux Bank 330 (Agee, FIG. 12), thus constituting a **radical change** in the Agee system and a **non-obvious application** of the Wallmeier system.

14. **The proposed combination of Agee and Walmeier would render these prior art references unsatisfactory for their intended purpose (MPEP 2143.01).** Specifically, Wallmeier teaches a switching system comprising FIFO buffers to perform data-flow scheduling such that a predetermined peak bit rate is not exceeded (col. 2, lines 40-51). In contrast, Agee teaches spreading data over multiple frequency bins and combining (superimposing) the data-modulated frequencies (FIG. 13, col. 17, lines 19-32). Agee's receiver employs linear combiners to remove co-channel interference (col. 14, lines 64-67). The suggested combination of Agee and Wallmeier would cause Agee's transmission system to produce non-interfering data streams, which are incapable of providing the benefits of increased Physical Layer channel capacity taught by Agee's linear combiner technique. Similarly, if Agee's Physical Layer spreading and combining were applied to Wallmeier's data switching system, quantization errors would occur, resulting in serious degradation in the data integrity of Wallmeier's switching system.

15. **The combination of prior art references Agee and Wallmeier, when considered in its entirety, teaches away from the claimed invention.** In particular, Wallmeier teaches multiplexing data in time, which is described with respect to **queueing and scheduling** processes to limit the peak **bit rate** (col. 3, lines 30-54). In other words,

Wallmeier teaches arranging data such that it does not overlap in time. If the symbols do not overlap in time, there can be no co-channel interference. Thus, Wallmeier's data formatting cannot be employed in Agee's Physical Layer without defeating the utility of co-channel interference removal taught in Agee. Consequently, **Wallmeier teaches away from a signaling format that is able to employ co-channel interference cancellation, such as recited in the present invention.**

Very respectfully,

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